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IT ENABLED ENVIRONMENTALLY FRIENDLY CONSUMPTION: IT FEATURES ADDRESSING CHALLENGES IN CONSUMER DECISION MAKING

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Abstract

The objective of this study is to investigate how IT may facilitate green consumption. Leveraging the Theory of Planned Behavior (TPB), the study proposes a framework to analyze the challenges consumers face in green consumption decisions. Challenges are identified in three dimensions: attitude formation, subjective norm, and perceived behavioral control. This framework can be generalized to various consumption scenarios, and help researchers as well as application designers identify context specific challenges.

The study then explains how IT applications/features may address the challenges. Social networking features enable individuals to go beyond their real world networks and connect with online friends who share the environmental concerns. Accordingly, the pool of relevant others changes, and individuals are more likely to be encouraged to consume environmentally friendly. Platforms of user generated contexts enable individuals to share their experiences and exert influence on others, and thus enhance individual's motivation for green consumption. The conceptual arguments are illustrated with a case study on Seafood Watch, which demonstrates how IT helps with ocean friendly fish consumption.

Keywords: Green Consumption, IT Applications, Social Networking, Theory of Planned Behavior

1 Introduction

As environmental problems worsen, scholars are paying more and more attention to environmental sustainability related issues (Vlek and Steg, 2007). Prior research on the topic can be divided into three streams according to the focal party. One stream examines the role of companies, and researchers discuss how companies can be socially responsible and reduce negative impact on the environment. Examples of research topics include business strategy adjustment and manufacturing process monitoring and improvement (Christmann, 2000, Russo and Harrison, 2005, Margolis and Walsh, 2003, Bansal and Roth, 2000, Hoffman, 1999). Another stream of research investigates government intervention, and discusses environmental policy design, enforcement, and implications (Stavins, 2003, Stewart, 1977, Castello´ et al., 2010). The third stream of research examines the role of individuals, especially the role of individuals as consumers. Studies in this stream emphasize individual consumption choice's influence on the environment, and try to explain why consumers engage in green consumption (Kollmuss and Agyeman, 2002, Degenhardt, 2002).

In this study, I focus on consumers, and investigate how IT may facilitate green consumption. Noting the role of IT in green consumption has been largely neglected and responding to the recent call for research on information systems and environmental sustainability in the IS community (Watson et al., 2010, Melville, 2010, Elliot, 2011), the current study aims to find out how IT may empower individual consumers to make green consumption choices.

I adopt social psychology theory to identify the potential challenges consumers face when making green consumption decisions. Based on the Theory of Planned Behavior (TPB), the study establishes a framework to analyze the challenges and categorize them into three aspects: challenges related with attitude formation, challenges related with subjective norm, and challenges related with perceived behavioral control. The framework can be applied to various consumption scenarios, and provides scholars with a systematic tool to examine specific consumptions decisions of their interest.

The study also investigates how IT features may address the challenges. For example, social networking features help consumers expand their pool for relevant others, and platforms with user generated contents enable consumers to share personal experiences and exert influence on others. To illustrate and justify the conceptual arguments, the case of Seafood Watch is explained.

2 Challenges in Consumers' Green Consumption

Scholars in environmental consumption have identified that there is a gap between consumers' environmental attitudes and every day behavior, i.e. individuals who claim they care for the environment do not behave accordingly when they consume (Kollmuss and Agyeman, 2002, Degenhardt, 2002). The discrepancy between the general attitude toward the environment and specific consumption behaviors suggests that individuals encounter challenges in green consumption decision making.

To identify the challenges, I adopt Theory of Planned Behavior (TPB), an attitude-behavior framework (Ajzen, 1991). TPB states that behavior results from behavioral intention, which in turn is influenced by attitude, subjective norm (i.e. perceived social pressure), and perceived behavioral control. Attitude is composed of beliefs of the behavioral outcomes and evaluations of the outcomes. Subjective norm contains normative beliefs about the expectations of relevant others. Perceived behavioral control refers to people's perception of the ease or difficulty of performing the behavior, taking into consideration the facilitating or hindering factors. In the following, I categorize the challenges consumer face into the three aspects.

2.1 Challenges related with attitude formation

Since attitude is formed based on beliefs of likely outcomes and evaluations of those outcomes (Ajzen and Fishbein, 1980), consumers tend to have difficulty in forming a specific attitude toward certain consumption behavior when:

- They are not aware of the impact of a specific consumption decision on the environment
- They have difficulty in evaluating the impact of the specific consumption decision on the environment

It is difficult for a consumer to evaluate the impact of a specific consumption decision on the environment, especially when the impact is exerted throughout the production, manufacturing, and transportation stages rather than in the end consumption stage alone. Since the consumer cannot observe the manufacturing and transportation processes, he/she does not have enough information to estimate the impact on environment. For example, consumer may not be aware that wearing a certain pair of jeans may do harm to the environment due to the apparel's specific dyeing process.

Even if consumers realize that specific consumption may have impact on the environment, it is difficult to quantify that impact to form a firm attitude. Take an example of eating locally produced food, consumer might be aware that locally produced apple A has few carbon footprints comparing to overseas produced apple B. But what does it suggest? How much CO_2 emission has been reduced by eating apple A instead of eating apple B? Is that a significant amount? If consumers hold ambiguous attitude, they may behave inconsistently.

2.2 Challenges related with subjective norm

Subjective norm refers to an individual's perception of social normative pressures, i.e. relevant others' beliefs that he or she should or should not perform a certain behavior. In the context of green consumption, the concerns related with subjective norm are:

- Who are the relevant others?
- What if the relevant others do not think the specific green consumption is important?
- What if the relevant others do not engage in the specific green consumption?

In everyday life, individual's relevant others are likely to be his/her real life friends, or people he/she encounters on the spot of the decision making (e.g. sales person). If these relevant others do not think the specific green decision is important, nor do they perform that behavior, the consumer will be under conformity pressure, and hence may not perform the green behavior. For example, for a consumer sitting in a seafood restaurant for dinner, the relevant others might be the friends who go with him/her. While the consumer may prefer ocean-friendly seafood and hopes to check the menu carefully, his/her friends may not think it necessary, and the consumer is likely to conform to his/her friends.

2.3 Challenges related with perceived behavioral control

Perceived behavioral control is formed through evaluating factors that either facilitate or hinder the targeted behavior. In order to understand why people do not consume environmentally friendly, I examine the hindering factors of green consumption.

- Cognitive efforts constraints
  As previously explained, to evaluate a product's overall impact on the environment, a consumer needs knowledge about its entire life cycle (Huijbregtsa et al., 2008), e.g. how the raw materials are supplied, how the product is delivered from the manufacturer to the retailer, etc. The cognitive

effort required to gather, process, and evaluate the information is substantial. An individual consumer probably could not afford to do so in every consumption decision.

- Time constraints
  Many consumption decisions are made within a certain time period. For example, when going to restaurants for meals, a consumer cannot take too much time examining the menu. Time pressure also limits a consumer's ability to search and process information.

To conclude the discussion in this section, I summarize the challenges in Table 1 below, according to the TPB framework:

TPB Dimension	Definition	Challenges
Attitude	Attitude is composed of beliefs of the behavior outcomes and evaluations of the outcomes.	• Lack of awareness of the impact of specific consumption decision on the environment • Difficulty in evaluating the impact
Subjective Norm	Subjective norm contains normative beliefs about the expectations of the relevant others.	• Who are the relevant others? • What if the relevant others do not think the specific eco-friendly consumption is important? • What if the relevant others do not perform the specific eco-friendly consumption behavior?
Perceived Behavioral Control	Perceived behavioral control refers to people's perception of the ease or difficulty of performing the behavior.	• Cognitive efforts constraints • Time constraints

Table 1. Challenges according to the TPB framework

3 IT Enables Consumers to Consume Environmentally Friendly

In the previous section, I have analyzed the challenges consumer face in each of the three aspects: attitude formation, subjective norm, and perceived behavioral control. In this section, I discuss how IT features/applications help consumers address these concerns and enable them to make green consumption decision.

3.1 IT features addressing challenges related with attitude formation

3.1.1 IT features help consumers evaluate consumption impact on the environment

- Estimating consumption impact
- Recording consumption history and accumulating consumption impact

One of the challenges identified is the difficulty in evaluating the consumption outcomes. IT applications can facilitate consumers to estimate the impact of their consumption, so they can easily evaluate the outcome. IT applications can also record consumers' consumption history, allowing consumers to reflect on their past behavior and make adjustments accordingly. Impact accumulation feature aggregates the impact of each consumption. Although the impacts may be marginal when considered separately, once accumulated, the overall impact can be significant. According to self-determination theory (SDT, a theory of motivation) (Ryan and Deci, 2000), when consumers can clearly perceive the impact of their behaviors, and the impact is significant, they will be more motivated to consume in a green manner.

3.1.2 IT features help evaluate consumption Impact on the other consumers

- Enabling consumer contribution
- Availability of various IT sharing channels to reach different audiences

IT applications offer consumers greater autonomy in contributing. Consumers can share personal views and experiences through multiple channels: 1) personal channel, such as blog, Twitter page, Facebook profile; 2) e-commerce website's feedback mechanism, such as Amazon's customer review system; 3) third-party reviewing site, such as restaurant rating and reviewing site Zagat.com. Through different channels, consumers can target different audiences.

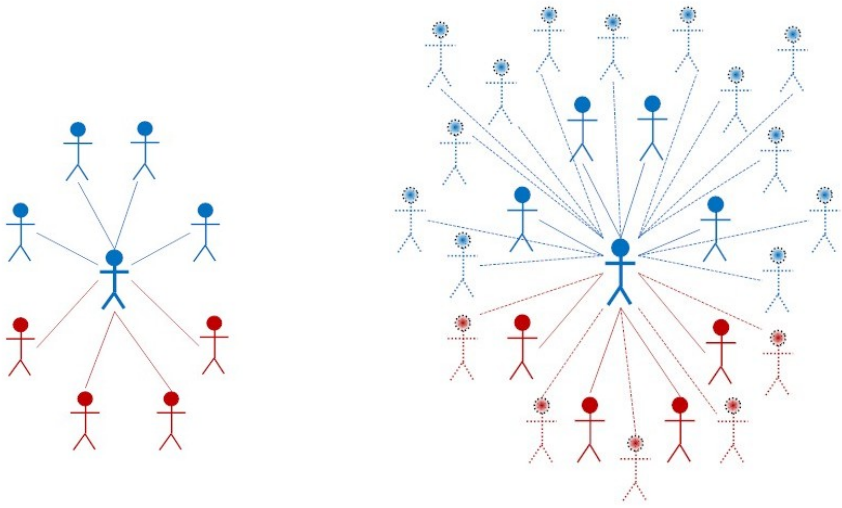
Consumers' contributions provide valuable information for others to make purchasing decisions (Chevalier and Mayzlin, 2006). According to SDT (Ryan and Deci, 2000), as consumers perceive larger impact of their contribution and greater autonomy, they will be more motivated and more likely to contribute in the future.

3.2 IT features addressing challenges related with subjective norm

Challenges related with subjective norm are salient especially when the relevant others do not wish the consumer to engage in green consumption.

3.2.1 Social networking tools changing the pool of relevant others

IT enabled social networking tools help consumers to get connected with people whom they do not have opportunity to interact with in real life (Ma and Agarwal, 2007, Wasko and Faraj, 2000). Considering the diversities of online communities, it is reasonable to assume that an individual consumer could always find a group of people who share his/her environmental concerns. Regarding the specific consumption choice, If one's needs for association and belongingness (Baumeister and Leary, 1995) can be fulfilled through interaction with online friends, one is likely to consider those online friends, instead of the real life friends, as the relevant others when making consumption decision.



Sample of relevant others in real life

Sample of relevant others expanded, with the help of social networking tools

Figure1. Social networking tools expand a consumer's relevant others pool

Figure 1 illustrates how social networking tools and online community expand a consumer's pool for relevant others. The blue human figure in the center is our focal individual. The other blue figures, similar in color, represent those who hold the same environmental belief as him/her. The red figures, different in color, represent those who hold different environmental belief. With social networking tools, the consumer gets to know more people online, represented by human figures connected with the focal figure through dotted lines. Among those virtual friends, he/she may identify those who hold the same environmental belief and change his/her sample of relevant others.

3.3 IT features addressing challenges related with perceived behavioral control

Mobility
Mobility enables consumers to search for information anywhere, anytime. This is especially helpful for on-the-spot, impromptu consumption. The applications on iPhone and Android mobile phones give consumers greater mobility.

Location services
IT applications with GPS enabled location services can provide consumers with location specific information, significantly reducing consumers' efforts in gathering and evaluating information.

Searching
Searching is a very basic feature, but is worth listing separately. Searching greatly eases information gathering and processing, and reduces the required cognitive efforts.

Table 2 summarizes the challenges and corresponding IT features/applications which address the challenges. I also propose the possible underlying psychological mechanism through which the IT features may intervene. It shall be noted that, the listed IT applications/ features are not meant to be exhaustive.

Aspect of Challenges	Challenges Related with Attitude Formation		Challenges Related with Subjective Norm(SN)	Challenges Related with Perceived Behavioral Control (PBC)
Sub-dimensions	Outcome/impact awareness and evaluation		Sampling of relevant others	Cognitive efforts constraints Time constraints
	Impact on the environment	Impact on other consumers		
IT Features Addressing the Challenges	Estimating consumption impact Recording consumption history Accumulating impact	Enabling consumer contribution Sharing personal experiences Receiving other's feedback	Social networking tools and online community	Mobility Location services Searching
Possible Underlying Psychological Mechanism	Perceived impact→ motivation→ behavior	Autonomy, meaning→ motivation→ behavior	SN→intention →behavior, Self-identity →behavior	PBC→intention→ behavior

Table 1. IT features addressing the challenges

4 Case Study: Seafood Watch

This case illustrates how IT applications facilitate consumer's green consumption of seafood.

4.1 Background

Oceans help to regulate the climate and contain a very delicate ecosystem. Oceans have been supplying us with seafood throughout human history. The development in fishing technology in the last century has enabled people to fish more efficiently, and has led to the problem of overfishing. As for fish farming, various fish farming methods have different impact on the environment. In addition, the transportation required to get seafood to consumers also consumes considerable energy.

To address these challenges, Monterey Bay Aquarium (hereafter referred to as the aquarium) has been running the Seafood Watch program since 1999. The Seafood Watch program promotes sustainable seafood, in order to protect the ecosystem of the oceans and to reduce the impact on the environment.

To help consumers make sustainable seafood choices, the aquarium composes recommendations, by categorizing seafood into best choices, good alternatives, and avoiding choices. The categorization criteria are based on the combined consideration of the amount of the specific seafood in nature, the way it is caught or farmed, and the impact on other marine lives and the environment, referring to standards such as the standards of the Marine Stewardship Council (MSC). The recommendations are specific to the location of the consumers, and people can choose among the West Coast Guide, Central U.S. Guide, Northwest Guide, Southeast Guide, Southwest Guide and the Hawaii Guide.

Previously, the aquarium only provided hard copies of pocket guides, and distributed them to consumers on request. Consumers had to bring the pocket guides with them as they went out for dinning or shopping. As specific fishing procedures changed, the pocket guides, though periodically updated, sometimes became obsolete.

There was no systematic feedback between the aquarium and consumers, and the information flow was unidirectional, from the aquarium to the consumers. Interactions among consumers were limited, and it is difficult for people to reach others even if they are willing to share their experiences. Though they share the same environmental concern, they act as disconnected individuals and could not leverage the power of each other.

4.2 Seafood watch mobile phone application

The Seafood Watch application for iPhone and Android mobile phone changes the scenario. To help readers have better understanding of the technology, I include in Figure 2 the application screenshots from its official page on iTunes. Below I explain how the application's features help consumers to choose ocean-friendly seafood.

- The application contains seafood recommendation guides which are continuously updated.
  Each kind of seafood or sushi is labeled as Best Choice, Good Alternative or Avoid. Besides checking the guides, consumers can search for a seafood or sushi name to find if it is a green choice. Detailed information regarding the specific seafood or sushi is provided when a consumer clicks through the hyperlink.

- The application uses GPS to determine a consumer's position, and automatically find the appropriate regional guide.

- A consumer can search for restaurants or stores that sell green seafood around his/her location, enabled through GPS and a continuously updated database of businesses. One will not only find the name and location of the business, the overall number of recommendations the business receives; but also discover what specific ocean-friendly choices the business offers, how many times each choice has been found available, and the last time somebody ordered the seafood there.

  For example, a consumer around CA 93940 (This example is different from the one shown in the screen capture figure.) will find Admiral Risty Restaurant which received 39 overall reports. The restaurant offers 14 kinds of ocean-friendly seafood, from Arctic Char farmed in recirculation systems, to spiny lobster caught wild from California and the Pacific coast of Mexico. In this way, searching costs for green consumption choices are greatly reduced.

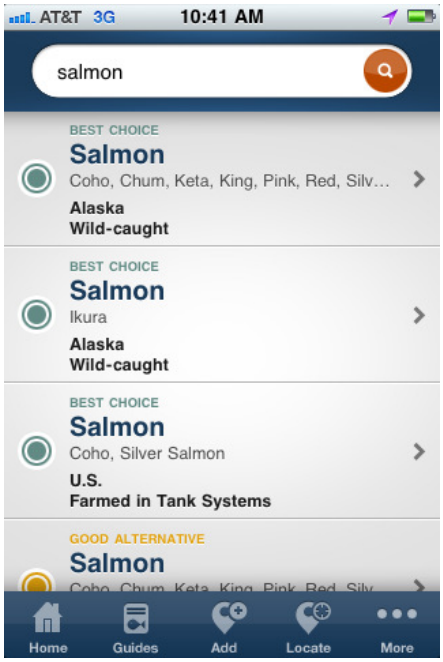
- A consumer can report his/her consumption experiences and keep the records of the business updated. The number of recommendation reports the business received, and the last reported date for a certain seafood choice, are salient signals for other consumers as they decide whether they will go to the business. Only through collaborative efforts can the record be accurate and updated.

- Once a consumer has found environmentally friendly seafood in a certain restaurant or store not in the database, he/she could add the name of the business, and share the location of the business through the application. In this way, consumers can directly contribute to the project and help each other.

- Seafood Watch encourages consumer participation through a Badge system. Each recommendation made by a consumer is recorded, and badges will be assigned according to consumer's contribution history. Hence, consumer can track the impact he/she has made in the community.

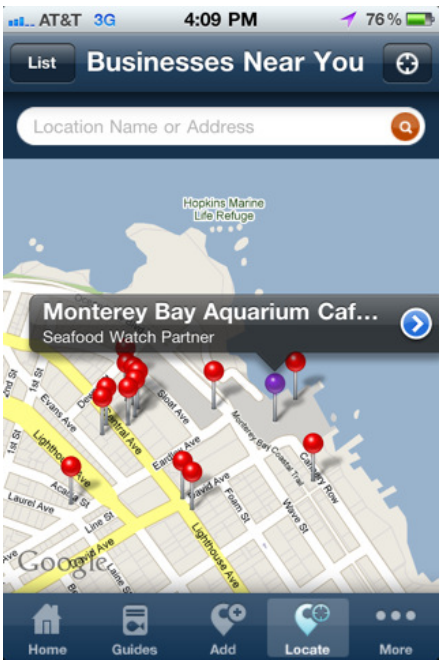
- Through the application, the aquarium updates consumers with news, activities, and recipes using ocean-friendly seafood as materials. Consumers can also send feedback though the application.

The entry interface

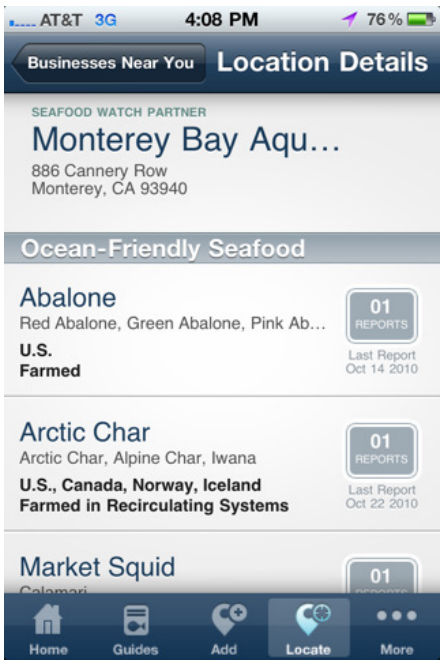


Various types of salmon labeled according to

impact on the environment



Nearby restaurants which offer ocean-friendly seafood choices



Choices offered by a specific restaurant and other consumers' reports

Figure 2. Seafood watch iPhone application screenshots from its official page on iTunes

4.3 Seafood watch web presences

Besides the mobile application, Seafood Watch also has multiple web presences. At the end of February 2012, the Seafood Watch Facebook page (http://www.facebook.com/seafoodwatch) has received 15,302 likes. Its twitter page (https://twitter.com/#!/seafoodwatch) has 11,286 followers. Those who are concerned about oceans not only become aware of the information shared by Seafood Watch, but also become aware of the existence of other people who share the concerns. On these platforms, consumers could easily express their opinions through comment, like or retweet (a twitter feature, similar to share), and discuss with others. They could also get connected with one another through friend invitation or following.

4.4 Influence on the business side

The aggregation of consumers' power has made restaurants and retailers realize consumers' environmental concerns and potential business opportunities. Chefs are contributing sustainable recipes, restaurants and retailers are joining as partners. For example, Whole Foods Market (NASDAQ: WFMI) has partnered with Monterey Bay Aquarium and Blue Ocean Institute, and has started categorizing all the wild-caught seafood sold in 298 stores. The corporation has committed to stopping selling red-rated Avoid species by March 2013.

5 Conclusion

As a response to the call for IS research on IT and environmental sustainability, this study investigates the role of IT in green consumption decision making. The problems I address in the study are of both practical and theoretical relevance.

Noting that prior literature has identified the discrepancy between the general attitude toward the environment and specific consumption behaviors (Kollmuss and Agyeman, 2002, Degenhardt, 2002), the study first analyzes the challenges consumers face in actual consumption. Relying on TPB, I propose a framework to analyze the challenges consumers face when making green consumption decisions. This framework can be applied to various consumption scenarios, and provide scholars with a perspective to examine consumption decision of their interest. For example, for product which has higher impact on the environment in the manufacturing and transportation stage comparing with in the end consumption stage, researchers may investigate how to provide consumers with information regarding the product's entire life cycle. For consumption behaviors which has clear impact on the environment but may be easily influenced by relevant others, such as purchasing a vehicle or a bicycle for commute, researchers may examine who are the focal individual's relevant others. In this way, the framework enables us to systematically analyze the challenges in specific consumption decision and help us identify the aspects which require more attention.

The study also explains how IT applications/features address the challenges. IT applications have long been credited for synthesizing information, and hence help with attitude formation and perceived behavior control. In addition, I highlight the IT features emerging in the recent decades, such as the social networking capabilities, which enable consumer to expand their sample of relevant others beyond their real life acquaintances. As individuals explore the online communities and get connected with those who share the environmental concerns, they may consider online friends as relevant others, and are more likely to engage in green consumption. The various review platforms with user generated contents allow individuals to share their opinions and experiences. As individuals may influence others through these platforms, they may have higher perceived impact and higher perceived autonomy, and are more motivated to consume in an environmental friendly manner. These theoretical arguments have been illustrated with the case of Seafood Watch on green seafood consumption.

Overall, the study is one of the early endeavors in investigating IT and green consumption. Considering the seriousness of the environmental problems and the readiness of technology, we IS researchers shall spend more efforts in investigating how IT can address environmental problems, and cooperate with practitioners to make a difference.

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